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Stress in College Students: Worse Than the "Freshman 15?"

Kristen Higgins
Murray State University

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Cover Page Footnote
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Introduction

Chronic stress is linked to the six leading causes of death: heart disease, cancer, lung ailments, accidents, cirrhosis of the liver, and suicide (American Psychological Association, 2018). Most individuals' experiences with stress are normal; however, chronic, or long-term, stress has serious negative consequences. Although these studies specifically examine college students in a laboratory setting, their findings also hold true in "real world" environments. For example, more than 75% of physician office visits are for stress-related ailments or complaints (APA, 2018).

This is not surprising, given the ways in which stress affects the body. Acute stress, or short-term stress, activates the sympathetic nervous system, triggering the human body to go into the fight or flight response. During this response, the body releases hormones such as norepinephrine, tightens muscles, and increases heart rate (Streeter, Gerbarg, Saper, Ciraulo, & Brown, 2012). The increased heart rate causes rapid and shallow breathing which constricts blood vessels supplying digestive organs and halts digestion. Normally when the stressful situation passes, the body switches to the parasympathetic nervous system, causing a "resting" state and restarting digestion (Streeter et al., 2012). However, with chronic stress the body fails to switch to the parasympathetic nervous system and never recuperates from the stress. This has severe consequences, as the body stops important processes while sending others into overdrive (DeLongis, Lazarus, & Folkman, 1988).

Stress is not limited to adults and can be found in children as well (APA, 2018). Research has shown that 27% of teens reported stress levels of an 8, 9, or 10 on a 10-point scale (APA, 2013). More alarming is that 31% of teens reported that their stress levels had increased during the past year and 34% of teens reported that their stress levels would likely increase during the upcoming year (APA, 2013).

High levels of stress were reported by 52% of college students during the semester (Hudd et al., 2000). This evidence shows that stress is an increasing epidemic with adolescents today.

Students in today's fast-paced society are involved in numerous activities, clubs, extracurricular activities, and more (American Academy of Sleep Medicine, 2008). As individuals become involved in more activities, they can experience more stress, with which they are oftentimes ill equipped to deal (Lau, Hem, Berg, Exeberg, & Torgersen, 2006). The lack of coping skills combined with increased levels of stress can lead to chronic stress, thereby harming an individual's well being (Lau et al., 2006). Chronic stress can lead to the development of depressive symptoms and anxiety. This is cause for concern, since 95% of college student suicides are a result of anxiety or depressive disorders (Walsh, 2005).

Certain personality traits, lack of sleep or an unstable sleep pattern, and dissatisfaction with social relationships make individuals more susceptible to stressful events. Norwegian police officers with higher extraversion and lower neuroticism reported less stress compared to those who were insecure, low in extraversion, and high in neuroticism (Lau et al., 2006). Similarly, individuals low in extraversion and conscientiousness reported using fewer coping strategies for stress, which made stressful events more difficult for them (Lau et al., 2006). That study examined police officers, which is a stressful occupation, while this study focuses on college students, who also experience high levels of stress. The amount of stress experienced may be influenced by the individual's ability to effectively cope with stressful events and situations. An individual's lack of coping skills leads to higher stress levels and many negative effects (D'Zurilla & Sheedy, 1991). Individuals may or may not be able to prevent the preceding; however, certain populations could experience higher levels of stress than others.

Health Effects

It is important to learn the major causes of stress and whether these factors can be prevented. Stress affects many individuals today and, as mentioned, can lead to a variety of other health issues. If stress is not effectively dealt with, a person can experience loneliness, nervousness, excessive worrying, and sleeplessness (Ross, Niebling, & Heckert, 1999). Higher stress levels and night-eating syndrome, which is characterized by a delayed pattern of eating, were also linked (Wichianson, Bughi, Unger, Spruijt-Metz, & Nguyen-Rodriguez, 2009). The individuals who were night eating more often likewise used less adaptive coping strategies (Wichianson et al., 2009).

Stress in college students is associated with health issues, depression, anxiety, difficulties with attention, and lower satisfaction with life (Brougham, Zail, Mendoza, & Miller, 2009). In addition, chronic stress during adolescence and adulthood can affect the development of the prefrontal cortex, which has lasting effects on glucocorticoids, thereby affecting the efficiency of the immune system (Lupien, McEwen, Gunnar, & Heim, 2009).

Causes of Stress

It is important to understand what aspects of life cause stress. Most stress college students experience is caused by trouble with academics, health problems or fatigue, and interpersonal issues (Park, Armeli, & Tennen, 2004). The severity of stress depends on the perception of, and coping with, the stressful event. This differs immensely on an individual basis (Lau et al., 2006).

College students experience rapid change over a short period of time. When transitioning to college, students adapt to living (oftentimes) in a different city than their immediate family and learn aspects of daily life new to many college

freshmen, such as doing laundry and providing meals for themselves. This move to college is not a single event, but a process. This results in college freshmen, specifically, experiencing high levels of stress (D'Zurilla & Sheedy, 1991). College students take on new roles and acclimate to a vastly different environment. Increased changes in an individual's life, especially negative events, increase the likelihood of illness or injury during that year (Thoits, 2010). College students' experiences can leave them susceptible to stress and subsequent health effects (D'Zurilla & Sheedy, 1991). Being overtired is also linked to an inefficient immune system, inability to cope with stress, increased risk of high blood pressure, heart disease, and more (Roddenberg, 2007). Having to handle independence and learn the consequences of different decisions can be difficult. Moreover, college freshmen can experience homesickness (Pistole, Roberts, & Chapman, 2010). Individuals who rated greater social support, specifically from their families, showed an increase in not only stress levels, but also negative physical health symptoms (Zaleiski, Levey-Thors, and Schiaffino, 1998). This could be due to parting with the family, friends, and significant others at home. While these stressors typically decrease as a student adapts and progresses through their undergraduate career, there are some stressors that persist: deadlines, issues with interpersonal relationships, grades, pursuing further education, and more (Ross, Niebling, & Heckert, 1999).

Coping Mechanisms

Coping strategies are employed by an individual to deal with a stressful event, day, situation, task, or more. There are three categories of coping strategies, or coping mechanisms: avoidance, emotion-focused coping, and problem-focused coping. Avoidance coping strategies are any effort to escape a stressful situation or stop thinking about what is causing the stress. Several examples are binge drinking,

social withdrawal, and procrastination. Emotion-focused coping strategies are actions in which an individual expresses their emotions or feelings about the stress, causing them to process the stress. Examples are talking with a friend, journaling, and meditation. Problem-focused coping strategies involve trying to solve the problem or work to decrease the cause of the stress (Park, Armeli, & Tennen, 2004). Various examples include removing oneself from the stressful situation, looking for information about how to handle the stress, and taking responsibility for the situation or stress. Problem-focused coping strategies are associated with better health and life outcomes, while certain emotion-focused coping strategies are linked to poorer health and emotional outcomes (Dunkley, Mandel & Ma, 2014). However, not all emotion-focused coping strategies are the same. Some emotion-focused coping strategies are associated with better outcomes (Schreier, Carver & Bridges, 1994). Some effective coping strategies are humor, social support, exercise, action and planning, and expressing emotions (Abel, 2002; Dumont & Provost, 1999; Brougham, Zail, Mendoza, & Miller, 2009). Overall, the most effective strategies employ acceptance behaviors and take action to change the situation or the thought process regarding the stress (Brougham, Zail, Mendoza & Miller, 2009).

Social support, a problem-focused coping strategy, is a positive coping strategy that can influence health and social behavior (Sarason, Sarason, Shearin, & Pierce, 1987). Students' ability to deal with stress greatly increases when using social support (Kenny & Rice, 1995). Although, sometimes conflicts within an interpersonal relationship cause more stress than the relationship relieves. In addition, self-efficacy has been found to help protect against stress and stressful events (Roddenberry, 2007). Individuals evoke problem-focused coping strategies when they feel something constructive can be done to deal with or eliminate the stress (Shreier, Weintraub, and Carver, 1986). When the situation appears hopeless, individuals evoke maladaptive strategies. Emotion-focused coping strategies are

typically maladaptive because they often involve making the problem worse, rather than facing the issue or finding a way to solve it.

Just as people experience stress differently, they also cope with stress differently. For example, there are differences in how optimists and pessimists deal with stress (Shreier, Weintraub & Carver, 1986). Males and females, too, use different coping strategies from one another (Brougham, Zail, Mendoza, & Miller, 2009). Women, generally, rely more on social support and explain their feelings about the cause of the stress than men (Dwyer & Cummings, 2001). Men typically turn to alcohol, or use mental disengagement more than women (Kieffer, Jahn, Otte, Naber, & Wiedemann, 2006). Additionally, men are more likely to use problem-focused coping strategies, whereas women are more likely to use the less-effective emotion-focused coping strategies (Berghuis & Stanton, 2002; Brougham, Zail, Mendoza, & Miller, 2009; Wichianson et al., 2009). College women specifically are more likely to use the strategies of self-help, approach, and accommodation while college men are more likely to use avoidance and self-punishment strategies (Gagne & Zuckerman, 2003). Gender differences exist in the use of coping strategies.

Unfortunately, individuals often use ineffective or harmful coping strategies. For example, avoidance coping is associated with increased negative emotions (Berghuis & Stanton, 2002). In contrast, problem-focused coping is correlated with decreased negative distress (Terry & Hynes, 1998). Better outcomes are also seen when individuals feel in control of the situation/circumstances or have a strong religious identity (Zuckerman and Gagne, 2003; Ellison, 1991). Feeling in control of one's own circumstances exemplifies an internal locus of control. This is when an individual feels they can change the outcome of their life and therefore have control over stress. An external locus of control attributes the outcomes in one's life to outside forces, such as a higher power. The belief in a higher power helps individuals manage stress better through prayer, positive thinking, and more

(Siegel, Anderman, & Schrimshaw, 2001). Though some coping strategies cause more physical and emotional problems than stress alone.

Alcohol is an avoidance coping strategy, as it is used to eliminate negative emotions associated with stress. However, drinking creates a positive feedback loop, which further encourages the use of alcohol to "deal" with stressful situations (Oakland, 2015). Students tend to drink more on days that they employ fewer problem-focused coping mechanisms and on more stressful days (Park, Armeli, & Tennen, 2004). In fact, stress is one of the factors that influence the development of heavy drinking in college students, leading to the development of drinking problems post-graduation (Baer, 2002). Sixty percent of college students drank alcohol in the past month and 66% of those students reported binge drinking during that same time period; binge drinking can have many negative health effects (National Insitute of Aclochol Abuse and Alcoholism, 2015, Perkins, 2002).

Common coping strategies include sleeping, listening to music, playing sports, spending time with friends, isolation, and praying (Sheikh, 2004). However, task-oriented or problem-focused coping strategies best help students in decreasing stress levels (Higgins & Endler, 1995). Research has shown that meditation, gratitude journals, and being informed about coping strategies can cause better outcomes for individuals experiencing high levels of stress (Astin, 1997; Rash, Matsuba, & Prkachin, 2011; Higgins & Endler, 1995).

Meditation. Meditation is one coping mechanism shown to curb the side effects of large amounts of stress, along with aerobic exercise and a nutritious diet (Astin, 1997). Meditation is an emotion-focused coping strategy, as the individual is trying to relieve the negative emotions resulting from stress. Meditation, or progressive relaxation, focuses on loosening tension throughout the body and forcing the body to stop the "fight or flight" response and enter a "resting" state (Mackereth & Tomlinson, 2010).

Gratitude Journals. Writing in a gratitude journal is a form of emotion-focused coping, in which an individual will reflect on that which they are grateful for, and which makes them happy. Individuals who wrote in a gratitude journal once a day for four weeks showed an increase in satisfaction with life and self-esteem (Rash, Matsuba, & Prkachin, 2011). The gratitude journal acts as a support system, in which an individual can divulge information without feeling judgment from another individual (Rash, Matsuba, & Prkachin, 2011).

Informational Videos. Learning about stress and effective ways to handle it, through watching an informational video, is considered an active, problem-focused coping strategy. It involves learning about solutions to reduce stress. It is important that individuals take that information and employ an effective coping strategy. If the individual fails to use an adaptive coping strategy, the stress may not be reduced (Higgins & Endler, 1995).

Importance of Studying Stress and Coping Mechanisms. Individuals prefer certain coping strategies to others, but some individuals are unaware that there are better ways to deal with stress. Numerous studies have shown certain personality traits, such as extraversion and conscientiousness, are protective factors toward stress. However, few studies have simultaneously studied the relationship between stress and variables such as: gender, personality, amount of sleep or sleep patterns, and satisfaction with social relationships. In addition, there is a lack of studies showing the efficacy of certain coping strategies in comparison to others. College students are expected to be successful in the real world; however, the process causes a diminished immune system, lower academic success, and more (DeLongis, Lazaraus, & Folkman, 1988).

It is important to learn the effectiveness of coping mechanisms so that individuals can be better prepared to deal with high stress levels, reducing the number of students experiencing high levels of stress throughout the semester. There are ways to cope with stress that most individuals are unaware of, including

meditation, journaling gratitude entries, more sleep, being more educated about stress, and others. In today's society stress can quickly overwhelm an individual, causing someone to fall behind in school and life, and in this case specifically, to drop out of college. Thus, there are dramatic effects on one's future. Seventy percent of Americans will study at a four-year college, but fewer than 66% of them will graduate with a degree, making them two times more likely to be unemployed than those with a degree (College Atlas, 2016). In addition, a male with a Bachelor's degree will earn about $900,000 more over a lifetime than a male with a high school diploma; while a female with a Bachelor's degree will earn about $630,000 more over a lifetime than a female high school graduate (College Atlas, 2016). It is important for the current generation to cope with daily stressors to eliminate negative outcomes.

The purpose of this study is to determine if, in the college student population, certain personality traits are protective factors for stress, if certain coping mechanisms are more effective than others, and if sleep can affect experienced stress levels. The first study defined the relationship between stress and other variables such as personality, satisfaction with social relationships, sleep patterns, and amount of sleep. The second study determined the effectiveness of coping strategies on stress levels. The goal was to determine the effectiveness of different coping strategies and to learn what coping strategies are being used by this population. Certain personality traits might lack efficient coping mechanisms needed to effectively deal with stress. In addition, certain coping strategies can be more harmful than helpful (substance abuse, denial, distraction, self-blame, and more). It will be easier to determine "at risk" individuals if there are certain risk factors for experiencing higher levels of stress. Once those individuals are identified, they can be educated on effective coping mechanisms needed to prevent the development of chronic stress. This could dramatically reduce the college dropout rate and future health problems.

Study 1

Hypotheses

The first hypothesis (H_1) is that introverted individuals will experience greater levels of stress than extroverted individuals. The second hypothesis (H_2) is that individuals who feel less satisfaction with their social relationships will experience greater levels of stress than individuals who feel more satisfaction with their social relationships. The third hypothesis (H_3) is that the individuals who sleep less or have varying patterns of sleep will experience more stress than individuals who sleep more or have a consistent sleep pattern. Lastly, the fourth hypothesis (H_4) is that the individuals who experience higher levels of stress will perform worse academically than individuals who experience lower levels of stress.

Method

Participants. The participants were 81 undergraduate students, enrolled in an introductory psychology course. There were 63 females and 18 males, ages 18-24 (M = 18.86, SD = 1.23). There were 74 Caucasian, 3 African-American, 1 Hispanic, 2 Bi-Racial, and 1 Asian/Pacific Islander. Of the 81 participants, 46 were freshmen, 23 sophomores, 9 juniors, 2 seniors and 1 non-specified.

Materials. Participants received a packet of materials, which contained a demographic survey, the Brief Big-Five Personality Inventory, the Relationship Assessment Scale, and the Stress and Self-Efficacy Scale (Rammstedt & John, 2006; Hendrick, 1988; Zajacova, Lynch, & Espenschade, 2005).

Demographic Survey. This scale has 12 items about basic information regarding the participants' age, sex, race, year in school, GPA, hours of sleep per night and whether their sleep schedule was consistent or varied on a night-to-night basis.

Brief Big-Five Personality Inventory. This scale, created by Rammstedt and John (2006), measures an individual's level of each personality trait. There are 10 items in this scale, rated on a 5-point Likert scale from 1 (*disagree strongly*) to 5 (*agree strongly*). An example of an item on the scale is, "I see myself as someone who…is reserved." Each personality trait is a subscale, consisting of 3 items all with reliable measures: Extraversion Subscale (α = .86), Agreeableness Subscale (α = .82), Conscientiousness Subscale (α = .79), Neuroticism Subscale (α = .86), and the Openness Subscale (α = .80).

Relationship Assessment Scale. Hendrick's (1988) scale measures participant's satisfaction with a social relationship. That is, their satisfaction with the support given to them by a close friend or a significant other. There are seven items in this scale, rated on a 5-point Likert scale from 1 (*very dissatisfied*) to 5 (*very satisfied*; α = .79). An example of an item on this scale is, "How well does your partner meet your needs?"

Stress and Self-Efficacy Scale. This scale measures a participant's stress and self-efficacy levels regarding certain social and academic tasks or situations (Zajacova, Lynch, & Espenschade, 2005). This scale consists of 27 items in which participants rank their levels of stress and self-efficacy on an 11-point Likert scale from 0 (*not at all stressful*) to 10 (*extremely stressful*). These tasks include studying, having enough money, and getting along with family members. There are two subscales in this scale: Stress (α = .91) and Self-Efficacy (α = .93).

Procedure. Students scheduled an appointment on SONA, a participant management system used primarily to recruit undergraduate students for studies, for in-person administration of several questionnaires. Upon arrival to the lab,

participants completed the packet of questionnaires. There were four parts to the questionnaire (basic demographic information, Big-5 Personality Trait Assessment, satisfaction with social relationships scale, and the stress and self-efficacy scale). Participants received credit for 15 minutes of participation, which went toward fulfilling a course requirement for research exposure.

Results

A series of Pearson correlations were conducted in order to test the hypotheses that stress would be associated with extraversion, social relationship satisfaction, sleep patterns, and academic success. Stress was positively correlated with participants' score on the Relationship Assessment Scale. There was a negative correlation between stress and extraversion, stress and sleep, and stress and self-efficacy. Exploratory analyses showed that stress was positively correlated with neuroticism. Stress was not related to any other personality variables. GPA was not significantly correlated with stress. See Table 2 for results. See Table 1 for descriptive statistics.

Table 1

Descriptive Statistics for Study 1

	N	Mean	Std. Dev.	Min.	Max.
BFI-10: Extraversion	81	6.14	2.08	2.00	10.00
BFI-10: Conscientiousness	81	7.46	1.39	5.00	10.00
BFI-10: Agreeableness	81	7.24	1.73	3.00	10.00
BFI-10: Neuroticism	81	7.15	1.97	3.00	11.00
BFI-10: Openness	81	7.05	1.85	3.00	10.00
Relationship Assessment Scale	81	32.05	5.90	12.00	37.00
Stress Scale	81	140.68	55.97	36.00	251.00
Self-Efficacy Scale	81	170.51	58.07	81.00	270.00
GPA	34	3.42	0.42	2.50	4.00
Expected GPA	81	3.53	0.35	2.50	4.00
Hours of Sleep Per Night	81	6.72	0.97	4.00	9.00
Number of Credit Hours	81	14.88	1.61	12.00	20.00

Note. $^{*}p<.05$, $^{**}p<.01$.

Table 2

Descriptive Statistics and Correlations Amongst Variables of Interest in Study 1

	1	2	3	4	5	6
1. Stress	--	.55**	-.24*	-.29**	-.42**	.34**
2. Neuroticism		--	-.14	-.22*	-.02	.15
3. Extraversion			--	-.11	-.29**	.07
4. Sleep				--	.32**	.02
5. Self-Efficacy					--	.63**
6. Relationship Assessment Scale						--

Note. $^{*}p<.05$, $^{**}p<.01$.

Discussion

In support of the hypothesis that stress would relate to levels of extraversion, results showed that extraversion was a protective factor against stress. Exploratory analyses showed that neuroticism was a risk factor against stress. The second hypothesis was not supported, as social support was a risk factor for stress rather than a protective factor. This could be due to characteristics of this sample.

This sample was primarily freshmen in their first semester of college. These individuals are more likely to experience stress from the transition to college (Thoits, 2010). Learning how to adapt to life at school rather than at home can be difficult. Many freshmen have begun long-distance relationships, either with their family, friends, or significant others (Pistole, Roberts & Chapman, 2010), which also contributes to stress levels. Sleep was negatively correlated with stress, suggesting that sleep is a protective factor against stress, in support of the third hypothesis. This is additional evidence supporting that sleep can combat and protect individuals from stress-related negative health effects (Caldwell, Harrison, Adams, Quin, & Greeson, 2010). The fourth hypothesis was not supported; there was not a significant correlation between GPA and stress levels. However, GPA is not a significant measure of academic performance in this sample as this was within the first few weeks of classes and the freshmen did not have a college GPA yet (Caulkins, Larkey & Wei, 1996). A better measure of academic ability would be high school GPA.

Study 2

Hypotheses

The first hypothesis (H_1) is the groups that underwent the interventions (an informative video, a guided-meditation video, or gratitude journal writing) will

experience lower stress levels after completing a stressful task than the control group. The second hypothesis (H_2) is that there will be a significant gender difference regarding the coping strategies used by males and females. The third hypothesis (H_3) is that stress levels will be higher in individuals who are less extroverted, those who experience less satisfaction with social relationships, and those who have fluctuating sleep patterns. The final hypothesis (H_4) is that college students with higher stress levels will perform worse academically.

Method

Participants. This sample consisted of 85 undergraduate students, enrolled in an introductory psychology course. The participants' ages ranged from 18-45 years old (M = 20.07, SD = 3.99). Seventy participants were Caucasian, 8 African American, 1 Hispanic, 2 Asian/Pacific Islander, and 4 Bi-Racial. There were 50 freshmen, 20 sophomores, 9 juniors, and 6 seniors. There were 26 male participants and 59 female participants.

These participants were divided into four different groups, which differed only in an experimental manipulation of a brief intervention: control (n = 23), guided-meditation (n = 23), informative video (n = 18), and gratitude journal (n = 21).

Materials. Participants received a packet of materials including a demographic survey, The Brief COPE inventory, 6-Item Social Support Questionnaire, Brief Big-Five Personality Inventory, two Perceived Stress Scales, and two basic arithmetic tasks (Carver et al., 1997; Sarason, Sarason, Shearin, & Pierce, 1987; Rammstedt & John, 2006; Cohen, Kamarck, Mermelstein, 1994).

Demographic Survey. This scale consists of information detailing participants' age, race, year in school, GPA, average hours of sleep per night, and whether their sleep schedule is consistent or varies each night.

Brief COPE Inventory. This scale has 28 items, which assess participants' use of different coping mechanisms in regards to stressful situations, on a 4-point Likert scale from 1 (*I haven't been doing this at all*) to 4 (*I've been doing this a lot*) (Carver et al., 1997). The Brief COPE inventory looks into specific coping mechanisms, categorized in this scale as: self-distraction (α = .84), active coping (α = .88), denial (α = .87), substance use (α = .93), use of emotional support (α = .90), use of instrumental support (α = .91), behavioral disengagement (α = .88), venting (α = .85), positive reframing (α = .90), planning (α = .88), humor (α = .91), acceptance (α = .88), religion (α = .92), and self-blame (α = .90). An example of one item measuring venting is, "I've been saying things to let my unpleasant feelings escape."

Social Support Questionnaire. This questionnaire measures the participant's satisfaction with social relationships and has the participant write down their relationship to those individuals (Sarason, Sarason, Shearin, & Pierce, 1987). The six items in this scale are rated on a 6-point Likert scale from 1 (*extremely dissatisfied*) to 6 (*extremely satisfied*; α = .91). An example of one item is, "Whom can you really count on to listen to you when you need to talk?"

Brief Big-Five Personality Inventory. This scale measures a participant's level of each personality trait (Rammstedt & John, 2006). There are 10 items, rated on a 5-point Likert scale from 1 (*disagree strongly*) to 5 (*agree strongly*). Each personality trait is a subscale: Extraversion (α = .86), Agreeableness (α = .80), Conscientiousness (α = .81), Neuroticism (α = .87), and Openness (α = .78). An example of an item measuring neuroticism is, "I see myself as someone who…gets nervous easily."

Perceived Stress Scale. This scale measures a participant's level of stress to different personal issues over the last month (Cohen, Kamarck, & Mermelstein, 1994). The 10 items in this scale rated on a 5-point Likert scale, from 0 (*never*) to 4 (*very often*; α = .89). One item in this scale is, "In the last month, how often have

you felt difficulties were piling up so high that you could not overcome them?" This scale was given before and after the timed math tasks.

Basic Arithmetic Task. Following the first Perceived Stress Scale was a brief arithmetic task, consisting of 10 addition problems, all with two three-digit numbers. For example, 637 + 321. The participants had one minute to complete the problems. Following the timed math task were two questions about the participant's level of stress after the math task and the degree to which they like math. There was one timed math task before and after the interventions were given.

Interventions. Following the first timed math task was the intervention (with the exception of the control group, who received no intervention): the informational video (https://www.youtube.com/watch?v=hnpQrMqDoqE), the guided-meditation video (https://www.youtube.com/watch?v=AbHKnkO9xW4&t=93s), or the gratitude journal entry. The informational video explained different ways to cope with stress. The guided-meditation video walked participants through a relaxation technique. Both videos were watched for three minutes. The gratitude journal entry had participants write for three minutes about things, people, or places in their life for which they are thankful or that make them happy.

Procedure. Like in Study 1, students scheduled an appointment on SONA for in-person administration of several questionnaires. The participants were informed about the study and presented with the questionnaires. There were seven parts to the questionnaire (basic demographic information, Brief Personality Inventory, Brief COPE Inventory, Social Support Questionnaire, mental arithmetic task, stress questions, and Perceived Stress Scale). Once the participants completed the first part of the questionnaire packet, they completed a timed basic arithmetic task, after which they answered two questions about the level of stress they experienced during the task, then the experimental groups watched either an informative video over ways to manage stress, a guided-meditation video, or they

wrote a brief gratitude journal entry. All of the manipulations were for three minutes. The control group did not complete any of these manipulations, but moved to the next timed math task. Then all participants completed another timed math task, after which the participants rated their stress levels again after using a coping strategy (or not using a coping strategy for the control group). Finally, the participants completed the Perceived Stress Scale again. Once finished, students were provided with a debriefing statement, and could then leave the classroom. The students received credit for 30 minutes of participation, for a course requirement for research exposure.

Results. In order to test the hypothesis that the interventions will change stress levels, a one-way ANOVA was conducted and found no main effect for intervention types on stress level F (3, 81) = .23, p = 0.871. Though not statistically significant, it is important to note that the means for the guided meditation video and the gratitude journal appeared higher than those of the control and informational video groups: control (M = 0.71, SD = 2.07), gratitude journal (M = 1.50, SD = 4.15), informational video (M = 0.61, SD = 3.96), and guided-meditation video (M = 1.09, SD = 3.49). See Figure 1 for results.

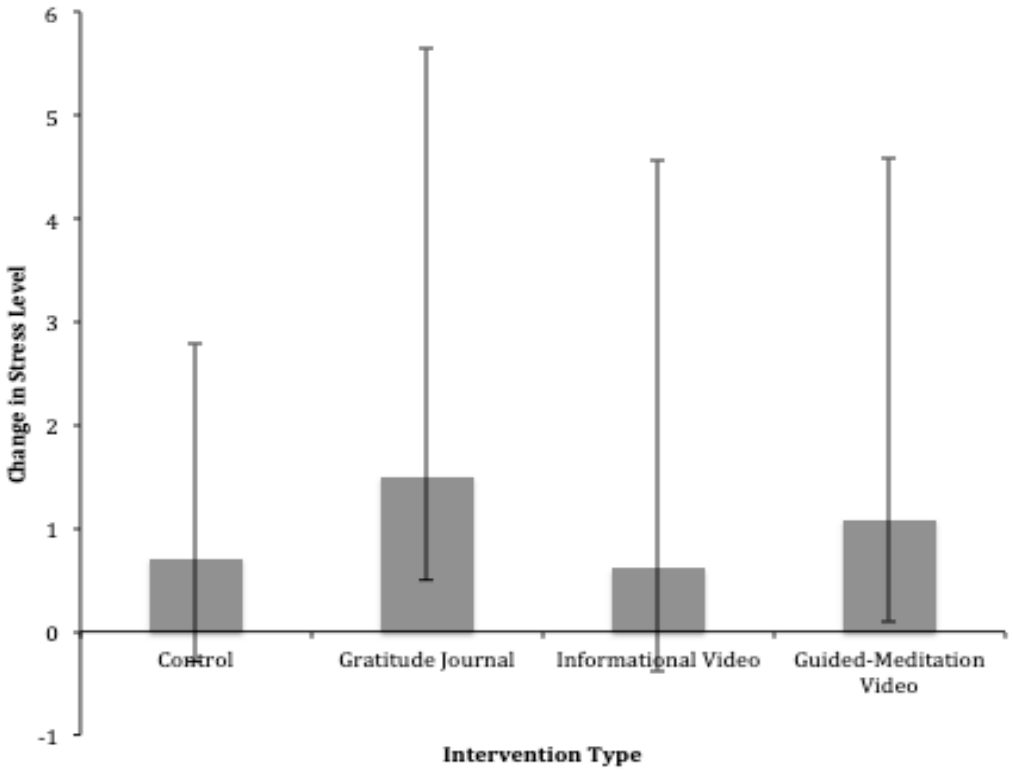

Figure 1. Effectiveness of different interventions on experienced stress levels.

To test the second hypothesis, that there will be sex differences in coping strategies, an independent samples t-test was conducted and found supporting statistics. There was a difference between sexes in regards to the types of coping styles they employ. There was a significant effect for sex on emotional support, t (84) = -3.16, p = .001, with men (M = 4.12, SD = 1.82) reporting using less emotional support than women (M = 5.66, SD = 1.80). There was also a significant effect for gender on religion, t (84) = -2.515, p = .01, with women (M = 5.02, SD = 2.29) reporting more religious behaviors than men (M = 3.69, SD = 2.09). In addition, there was a significant effect for gender on how many people they felt they were supported by, t (84) = 2.18, p = .039, with men (M = .8, SD = 1.58) reporting more times their social support consists of "no one" than women (M = .1, SD = .36). Lastly, there was a gender effect on instrumental support, t (84) = -3.874, p = .000) with women (M = 5.69, SD = 1.87) using instrumental support (direct ways in which an individual is assisted by another person) more than men (M = 4.04, SD = 1.64).

There were also significant correlations that replicate the findings of Study 1. In testing the third and fourth hypotheses, determining the relationship between stress and other variables, a series of Pearson correlations were conducted. A significant negative correlation was found between extraversion and stress, as seen in Study 1. Stress was positively correlated with unstable sleep patterns, similar to Study 1. However, a significant negative correlation was found between participants' scores on the Social Support Questionnaire and stress, contrary to what was found in Study 1. In this study, stress was also negatively correlated with conscientiousness and agreeableness and positively correlated with openness. Stress was again not significantly correlated with GPA. Exploratory analyses showed a significant positive correlation between neuroticism and stress. See Table 3 for results.

An exploratory regression analysis was run to determine if there would be a curvilinear relationship between GPA and stress levels, such that those with the lowest and highest GPAs would experience the highest levels of stress. The regression analysis showed that there was not a curvilinear relationship between GPA and stress, $R^2 = .02$, F (1, 84) = 1.65, $p = .20$.

Table 3

Descriptive Statistics and Correlations Amongst Variables of Interest in Study 2

	1	2	3	4	5	6	7	8	9
1. Perceived Stress Scale	--	-.25**	.28**	-.26**	-.39**	.20**	-.15	-.23*	.55*
2. Agreeableness		--	-.07	-.04	.19	.06	-.11	.20	-.13
3.Openness			--	.01	-.17	.34**	-.29*	.07	.00
4.Conscientiousness				--	.12	-.32**	.28*	.05	-.14
5. Social Support Questionnaire					--	.04	.03	.22*	-.20*
6. Sleep Pattern						--	-.12	.03	.08
7. GPA							--	-.10	.05
8. Extraversion								--	-.19
9. Neuroticism									--

Note. $^{*}p<.05$, $^{**}p<.01$.

Discussion

In regards to the first hypothesis, there was not a main effect of intervention type on stress level. However, limitations to this manipulation are the lack of power and large error bars, suggesting there was noise with the data. Noisy data suggests there was additional, meaningless information within the data. This could be due to the lack of attention checks in the study or the lack of interest in the coping interventions used. There was support for the second hypothesis seen by the differences between sexes regarding the most common coping strategies. Women

reported using emotional support, instrumental support, and religion more than men. Men reported being supported by "no one" more often than women. This replicates research that women use emotion-focused coping strategies more than men (Dwyer & Cummings, 2001). The correlations run for the third hypothesis revealed that extraversion and a consistent sleep pattern are protective factors against stress. Exploratory analyses showed that conscientiousness and agreeableness are also protective factors against stress, while neuroticism and openness are risk factors for stress. Previous research corroborates that conscientiousness and agreeableness lower stress (Murphy, 2011; Chu, Ma, Li, & Han, 2015). The fourth hypothesis was not supported, as there was not a significant correlation between GPA and stress levels, nor was there a curvilinear association between the two. Again, GPA is not a sufficient measure of academic ability in freshmen (Caulkins, Larkey & Wei, 1996).

Overall Discussion

This investigation showed variables related to high stress levels. As hypothesized, in both studies there was a negative correlation between stress and extraversion. This supports previous research that extraversion is a protective factor for stress. Often individuals who are more extroverted will use coping strategies, such as emotional and social support to help alleviate stress levels (Lau et al., 2006). Extraverted individuals seek out other people, with whom they can talk, thus using emotional and social support more so than introverted individuals (Lau et al., 2006).

Contrary to the hypothesis in Study 1, scores on the Relationship Assessment Scale were positively correlated with stress levels. Studies suggest, especially with college freshmen, that interpersonal relationships can cause stress rather than help relieve it (Zaleiski, Levey-Thors, & Schiaffino, 1998). This sample was largely college freshmen, all of whom were in their first semester of college.

They were possibly still learning how to adapt to life away from home, family, and friends. Attempting long-distance relationships has been found to add stress to relationships (Pistole, Roberts, & Chapman, 2010). A conflicting result was found in Study 2, which suggests that a more standardized measure of social support should be used, to increase reliability. Recent research proposes that individuals who receive more social support will experience lower levels of stress because the social support acts as an emotion-focused coping strategy (Kenny & Rice, 1995). Those social relationships will provide the individual with someone to whom they can talk about their problems and find solutions.

Importantly, the Relationship Assessment Scale in Study 1 did not have participants define on what relationship they were reporting. However, the Social Support Questionnaire in Study 2 did have participants identify their relationship to the supporters and most participants rated a mix of family members, close friends, and significant others. This suggests that because most participants reported a variety of relationships, social support is not based on one particular relationship, but rather multiple relationships. That could mean that breaking down social support based on one specific relationship would not be effective when looking at the association between social support and stress.

Sleep also plays an important role with stress levels. As hypothesized in both studies, a negative correlation was found between stress and average sleep per night. This means there is a relationship between the amount of sleep an individual gets, on average, and the amount of stress they experience. These results corroborate previous research suggesting that more sleep leads to better adjustment in daily life (Caldwell, Harrison, Adams, Quin, & Greeson, 2010). Unfortunately, more often than not, college students do not get the same amount of sleep every night, contributing to the experience of higher levels of stress (Caldwell et al., 2010). However, sleep is also positively correlated to self-efficacy, meaning that individuals who report greater amounts of sleep report greater levels of self-

efficacy. Individuals reporting greater levels of self-efficacy have more confidence in completing tasks and report greater satisfaction with life as well (Caldwell et al., 2010).

GPA was not significantly correlated with stress levels in either study. However, it could be that participants were not able to provide representative GPA information. Less than half of the participants reported a GPA in Study 1. In Study 2, freshmen participants only had one semester of course grades to factor into their GPA. GPA is rarely a good measure of academic ability because it does not adjust for course difficulty (Caulkins, Larkey, & Wei, 1996). This could cause the lack of relationship between these two variables. In addition, exploratory analyses revealed that there was not a curvilinear relationship between GPA and stress levels; further evidence that stress does not relate to this particular measure of academic achievement. Midterm grades, how much time spent on academic related work, or final high school GPA would be more appropriate measures for college students.

Exploratory analyses indicated that stress was positively correlated with neuroticism in both studies. Individuals who are more neurotic generally experience more anxiety, worry, loneliness, and frustration, which can all contribute to higher stress levels (Flett, Hewitt, & Dyck, 1989; McCrae, 1990). In this study, there was also a negative correlation between self-efficacy and stress, and a positive correlation between self-efficacy and sleep as well as self-efficacy and relationship satisfaction. This shows that not only is self-efficacy a protective factor toward stress, but it is related to many different aspects of life.

In Study 1, it is interesting to note that the mean for extraversion and the variance on that subscale varied from the other four personality traits, especially because that is the personality trait that was examined in Study 1. Additionally, extraversion was the personality trait most previous research showed related to stress. Also noteworthy is the average self-efficacy score being greater than the average stress score by 30 points. There was a wide discrepancy between the

minimum and maximum scores for each subscale. This suggests that some individuals experience more stress than others.

H_1 in Study 2 was not supported, as there was not a significant difference in stress levels after the interventions: guided-meditation, informational video, and gratitude journal entry. However, there was a lack of power in Study 2. The sample was primarily Caucasian, female, and freshmen. It is possible that with a higher-powered sample, a significant difference might be seen, specifically with the gratitude journal and the guided-meditation video. Shown in Figure 1, the means of the two aforementioned groups were higher than the informative video group and the control group. The gratitude journal and the guided-meditation video are examples of emotion-focused coping strategies, which have been found to help wellbeing (Berghuis & Stanton, 2002). This can explain the greater changes in stress levels for these groups. However, this study cannot verify that these interventions were significantly more effective than the other two. This could be in part because of the large error bars, seen in Figure 1. This means there was substantial noise in this study. It is possible that if attention checks were used, some of this error could have been eliminated.

The informational video that discussed ways to better deal with stress resulted in the smallest change in stress levels (see Figure 1). This could be due to the interest level of the participants. This video was not as interactive as the gratitude journal or the guided-meditation video, possibly causing participants to lose focus, resulting in minimal change in stress levels and showing this coping mechanism to be less effective than the others. The control group also showed minimal change in stress levels, as was predicted. The participants in the control group were not actively engaged in alleviating the immediate stress caused by the timed math task. The intervention that appeared to be most efficacious was the gratitude journal. However, as was mentioned, a significant difference was not

found for any of the intervention methods. While this study was broken down into smaller parts, it is possible participants were fatigued by the end of the study.

H_2 in Study 2 was supported, as there were gender differences found regarding the coping strategies men used compared to those used by women. Women used emotional support, instrumental support, and religion more than men. Women more often than men used emotion-focused coping, which relies heavily on discussing one's feelings and talking to another person about the stress one is experiencing and how it makes them feel (Berghuis, Brougham, Zail, Mendoza, and Miller, 2009). Women also use social support more than men, as this is another type of emotional support (Dwyer & Cummings, 2001). Religion is another type of emotion-focused coping strategy and women showed to use this more than men in this study (Ellison, 1991). Adaptive emotion-focused coping strategies help reduce negative affect. Instrumental support, however, is more of a problem-focused coping strategy because it is actively finding a solution to reduce stress (Park, Armeli, & Tennen, 2003). Examples are getting help around the house, such as with chores or babysitting, or receiving monetary support. Instrumental support is anything tangible that relieves stress. Although men typically use problem-focused coping strategies more than women, this sample was predominantly females and many college students receive monetary help from outside sources such as their family members or others (Shim, Barber, Card, Xiao, & Serido, 2009).

Other correlations similar to those in Study 1, regarding personality traits and stress levels, were seen in Study 2 through exploratory analyses. This increases the generalizability of the results, as the total sample of participants across the two studies is 166. Conscientiousness was significantly negatively correlated with stress in Study 2, although this result was not found in Study 1. This corroborates previous research that shows individuals high in conscientiousness experience less severe episodes of stress (Murphy, 2011). Stress was negatively correlated with agreeableness, replicating results from previous research, though not shown in

Study 1. Agreeableness has been found to be a protective factor toward stress and the physiological experience of stress (Chu, Ma, Li, & Han, 2015). That said, this might not have been found in Study 1 because of the small sample size accentuating individuals' differences. Overall, there were differences between the personality traits and the experienced levels of stress.

Depending on an individual's level of each personality trait they can be more susceptible to stress levels or can be protected from experiencing stress. It is important to note that in Study 2, the Perceived Stress Scale was used twice in order to determine if the coping intervention had an effect on stress levels. However, this scale proposes the participants think about stress levels over the past month. It is possible that coping strategies do not affect how an individual thinks about stress as a whole, but only in the current moment. This measure might not be sufficient to measure participant's current levels of stress, possibly causing a lack of difference in their stress levels regardless of the intervention used. There was one question regarding how stressed participants felt after completing the first math task and then how stressed they felt after completing the second math task (this second question would be after the intervention). However, more than one question would be needed to sufficiently measure stress, in order to determine changes in stress level. Some participants also rated their liking of math as low, but that does not mean that the task was stressful. Perhaps this task was not adequately stressful to cause a noticeable change in stress levels.

Further Research

In conclusion, certain aspects of behavior and personality, such as extraversion and neuroticism, may impact stress levels, making some students more vulnerable to the negative effects of stress. This is important, because more sleep, extraversion and self-efficacy are protective factors for stress and can help

individuals better deal with stress. Personality traits such as high levels of neuroticism, agreeableness, and openness are risk factors toward stress, as well as low levels of extraversion and conscientiousness. These studies show that greater social support may cause more stress than it helps eliminate, mainly with college freshmen. However, there are long-term benefits of social support from family members and friends (Kenny & Rice, 1995). College freshmen could experience greater levels of stress than older college students, due to this transitional period. Further research is needed to determine if stress levels decrease as college students mature. That would mean college administrators could focus their resources on college freshmen, to help them adapt to their first year at school and to provide them with the resources necessary to reduce stress. Although, research is needed to determine whether higher stress levels is a result of ineffective coping skills or lack of coping skills.

Additional research with a larger and more diverse sample can better determine whether results are generalizable. A larger, more diverse sample could show that guided-meditation and gratitude journal entries are statistically effective coping mechanisms. It is possible that coping mechanisms do not alleviate stress levels immediately, but in a slow process, just as acquiring chronic stress is a process (Salleh, 2008). This would mean coping strategies would need to be used for longer than a three-minute period and a longitudinal study would be a more effective research method. College administrators could then teach students how to use the coping mechanisms not once, but continuously, whenever they experience stress. The policy implications for identifying at-risk students are numerous. If a personality test can be administered to incoming freshmen, administrators could identify students at risk for higher levels of stress and educate those specific individuals on adaptive coping strategies.

This could decrease the student dropout rate. Using adaptive and effective coping strategies, rather than maladaptive coping strategies such as drinking, can

change a student's outcome. Once an individual develops the use of certain coping mechanisms, they often continue using them throughout their lifetime (Park, Armeli, & Tennen, 2004). Most people in today's fast paced society experience stress; however, it is how stress is dealt with that determines outcomes, which can affect the rest of their lives.

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